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THE VALUE OF THE MUSEUM[1]

By Dr. ROBERT MAYNARD HUTCHINS

PRESIDENT OF THE UNIVERSITY OF CHICAGO

WE meet to-night to celebrate the birthday of one of the great educational and scientific institutions of the world. Through its researches and publications it has advanced the four sciences to which it is devoted. Through its exhibitions and instruction it has enriched the life of the community it serves. The museum can boast that for two generations no child could grow up in Chicago without coming under its influence. We record to-night our gratitude to the founder and his family, to the hundreds of generous citizens associated with them and to the distinguished scholars who have made these contributions to the enlightenment of our city and the world.

As an educational institution Field Museum possesses certain special advantages. It has no football team. It gives no course credits or course examinations and awards no degrees. Its labors are not encumbered by the elaborate apparatus of academic bookkeeping which has resulted in education by the adding machine. The students of the museum come here to learn. They do not ask the museum to help them make friends, get a better job or give them a leg up the social ladder. The students come to the museum from the cradle to the grave. Formal education in schools, colleges and universities is something you finish. It is like the mumps, measles, whooping-cough or chicken-pox. Having had education once you need not, indeed you can not, have it again. You put it behind you with your other juvenile troubles, praise the Lord that it is over at last, and proceed to the really important tasks of life. The museum is free from this regrettable tradition. The museum is seduc-

[1] Address given at the ceremonies marking the fiftieth anniversary of the founding of Field Museum of Natural History, September 15.

tive. Perhaps because it does not employ compulsion, but woos the learner with artful wiles, it continues to deceive him into educating himself as long as he lives.

The combination of these advantages with the liberal and far-sighted policy of the board of trustees has given the museum a freedom and independence in the prosecution of its work that are enjoyed by few educational institutions. So Colonel Gregg felt able to say in 1939 that the sole purpose of the museum was to pursue knowledge for its own sake. He went on: "Whether its collections are used for the study of industrial scientists who seek to make a profit, by scholars who seek to solve some problem of research, or by casual visitors who seek recreation and enjoyment is not of primary concern to a museum. The only real concern is that the collections be available and that they be used."

The pedagogical significance of the collections is as obvious as it is great. The chief difficulty of any classroom teaching is the absence of three-dimensional reality, and the specialization, mechanization and urbanization of life are making the difficulty more serious every year. It may shortly be as hard to make an American city-dweller understand agriculture and its significance as it would be to discuss the Fiji Islanders with the Eskimos. Other educational institutions deal perforce with books and words. For that constant illustration of the idea by the fact which is indispensable to the communication of any ideas they must rely on the three-dimensional reality which can only be supplied by museums.

Armed with its peculiar advantages the museum goes forth to do battle with its peculiar problems. The first is produced by its origin and history. In 1931 the British Board of Education uttered the following melancholy reflections on the name museum. "Does it not suggest," the board said, "a depressing, decaying institution, the last resting place of travelers' mementos and of fossils which have undeservedly survived from ages long ago? The existing prejudice is deeply rooted in the tough soil of our language and in the popular mind, but it would most surely be overcome if a generation of children were given systematic opportunities of enjoying the treasures of modern museums." By the method recommended by the British Board of Education Field Museum has robbed the word museum of depressing or decaying connotations to such an extent that I am sure a Chicago audience will be surprised to hear that anybody thought it had any. In passing I should add that the facts seem to belie the gloomy attitude of the Board of Education toward the word museum in England. In 1939 a reliable authority stated that new museums had been opened in the British Isles at the rate of one every three weeks for the last ten years. Attendance at British museums has been steadily increasing during the war. By popular demand they remained open during the Battle of England and the blitz.

But the purpose of the second museum established in this country, that of the East India Marine Society at Salem, illustrates the problem that all museums are still trying to solve. The Salem museum was organized in 1799 to be a repository for the curious objects gathered by the ship captains of the town in the lands of the South Pacific, Indian and South Atlantic oceans. Such a museum, which was simply a cooperative curio cabinet, has the same relation to education as the stories of sea captains or the tales with which Othello, who was himself a sea captain, engaged the attention of Desdemona. They are interesting and amusing, and sometimes produce, as in Desdemona's case, sensational results. But they are usually ephemeral and often false—my sea-captain grandfather told me most atrocious lies—and such material, whether it is words or objects, should hardly be central in education. Whatever educational value it once had has now almost wholly disappeared, and its presentation is no longer the special function of a museum. The newspapers, the movies, the magazines and the department stores have long since taken over the job of gratifying the public appetite for the odd, the quaint and the amazing; and they have succeeded to such an extent that the public is largely indifferent to objects recommended to them because of their odd, quaint and amazing characteristics.

This problem is part of the larger problem of the relation between information and knowledge. Facts are indispensable, but they are not enough. Unrelated miscellaneous facts, however odd, quaint or amazing, are not knowledge, in spite of any impression to the contrary given by the Quiz Kids or Information, Please. The characteristic of knowledge is organization, which implies understanding, ordering and interpretation. A heterogeneous collection of facts is not knowledge; a heterogeneous collection of objects is not an educational institution. The art of the museum scientist, which is displayed at the highest pitch in this building, lies in the presentation of objects on an organized plan to convey meaning. For it is not the object that is important; it is the meaning of the object. The educated man is not one whose mind is a waste-basket or even an Encyclopedia Britannica of unrelated facts. He is one who grasps the significance of what he sees. An educational institution is one which helps its students to make these interpretations or at least to learn how to make them.

Education, to deserve the name, must be systematic. For this reason one may be permitted to doubt whether coast-to-coast radio broadcasting can ever deserve the name. It may encourage people to engage in systematic study, and hence be valuable as far as it goes. But since it can not be systematic, either in

its presentation or in what the listener does with it, it can not itself be education. The great museums have become systematic expositions of the arts and sciences with which they deal. They promote the comprehension of the facts presented. But the most systematic presentation of material must fail of its purpose if it is not systematically studied. The casual wanderer through the best of all possible museums will not get much education out of it unless he already has a good education in the facts and ideas which the museum is endeavoring to communicate. The casual caller without such education may be stimulated to get one; but he will not be educated by his call.

Therefore the maximum integration of the museum with other educational institutions in the community is the first requisite of its increased educational usefulness. Although the museum is so integrated with the public school system that no child can pass through the system without passing through the museum, the same relations do not obtain between the universities of the area and the museum, either in instruction or in research. The reason is partly the inertia of the universities and partly the small size of the museum staff. Highly valuable relationships do exist; but they are too few and too informal.

The universities are conducting teaching and investigation in the same sciences in which the museum is interested. The research of both groups should be advanced by cooperation between them. The teaching of the universities would gain reality by a more definite, planned exploitation of the museum's resources. The teaching of the museum achieves coherence as it becomes part of a course of study which gives some assurance that the student will begin at the beginning and go through to the end. The integration which the museum has achieved with the curriculum of the public schools should be rapidly extended to the higher levels through integration with the curriculum of the universities. This will require substantial additional funds at the museum to increase the staff so that it may be possible for members of it to participate in university work and give instruction here or on the several campuses to university students. But expenditures to promote cooperation in research and coordination in education are economies in the long run, for they help to get rid of the greatest waste in teaching and investigation, the waste of duplication, and their ultimate effect is to get the most out of every dollar spent for the advancement of learning in the community.

From habits of systematic study developed in their early years the museum may expect to obtain the systematic use of the museum by adults. The education of adults is and must remain the peculiar obligation and opportunity of Field Museum. This is much more important than the task of providing innocent amusement for the citizen's idle hours. The best index to the character of any civilization is the way in which those who have leisure use it. The Greeks said that work was for the sake of leisure. But their word for leisure was the origin of our word for school. They did not mean that work was to get the money to go to the movies or to Palm Beach. They meant that it was to provide the means for study, reflection and the duties of citizenship. And since they used their leisure for these purposes, they became the guides and teachers of all succeeding generations.

To the Greeks the object of life was happiness. Happiness consisted chiefly in the exercise of one's highest powers. And these powers were exercised in study, reflection and active participation in the life of the community. For these objects leisure was required, and one who did not have it could hardly be called human. The Greeks obtained their leisure in a way that does not commend itself to us. They got it through the ownership of slaves. Slaves were not people. But the leading thinkers among the Greeks went farther. They held the view that since leisure was indispensable to a human life, those who must spend all their time in menial, mechanical pursuits which gave them no inclination or opportunity for study, reflection or participation in the affairs of the community were not sufficiently human to be citizens of a good democracy.

In our own day, in our own country, the ideal of the Greeks has been attained. For slaves we have machines. The hours of labor have steadily fallen. The leisure which was the privilege of the few is now the prerogative of all. This process will continue. The concentrated labors of American scientists on military secrets have given an impetus to technology which will become apparent when the war is over. I believe that we are at the beginning rather than the end of the scientific revolution. Technology will continue to supply material goods in greater and greater quantities with a continuous decline in the amount of labor necessary to produce them. In spite of the cost of reconstruction and rehabilitation, in spite of enormous debts and enormous obligations to millions who are without the means of subsistence, the working day and the working week will continue to fall, and the amount of time which the worker will have at his own disposal will continue to rise.

Machines can set men free. But freedom is not an end in itself. It is no good to you unless you know how to use it. If we accept the Greek view that the good life is found through intellectual and moral development and service to the community, then true freedom is that which is devoted to these ends. The kind of civilization we have will depend on whether we can dedicate our increasing leisure to these ends

or whether we shall spend it once more, when we can, in driving furiously back and forth on the crowded highways, catching glimpses of the countryside between the billboards. The transformation of the American conception of leisure from time to waste into time to learn is one of the major responsibilities of the museums.

It is not education to make a living that we require, but education to make a life. For many, perhaps most, jobs in industry men can be trained in two or three weeks. As mechanization increases and we become a nation of button-pushers, the time needed to learn how to push the right button at the right moment will shrink still further. When jobs are available the worker can now get and hold one with less experience and skill than at any time in history. The knowledge and background necessary to make a living are approaching the vanishing point. But the difficulties of leading a good life and being a good citizen are greater than ever. And since our education has been largely devoted to vocational training and something called college life, we are unprepared for these difficulties. They place a strain on the intelligence and character of our people that has become almost intolerable. With increasing leisure we do not know what to do with ourselves. With the responsibility of leading the way to a democratic world community, we are unprepared to make the sacrifices required by a thoroughgoing democracy at home and unwilling to face the fact that a democratic world community, which offers the only hope for permanent peace, can not be achieved without the sacrifice of prejudices dear to our hearts—prejudices about foreigners and their goods and prejudices about the participation of foreigners in political decisions affecting our lives. Yet a world organization is on the way. There can be no doubt about that. The swift advance of transportation is making it inevitable. The only question is, what kind of world organization will it be? Will it be a despotism of that power or those powers which can hold down the world by force? If so, it will disintegrate as allies quarrel or as the oppressed and downtrodden gather the strength to rise against their masters. Will it be a democratic world community? If so, the responsibilities of the American educational system assume such proportions that we can only weep at the colossal triviality in which it has been wasting its days.

If every man is to be free, then every man must be educated for freedom. If every part of the world is to join in a democratic world community, then every part of the world must understand every other part. Transportation will not do the job. Faster transportation is just as likely to lead to more frequent and more terrible collisions as to world peace. Any community rests on communication, and communication means understanding. As the college must pass from the country-club stage which it has occupied too long, the museum must change from a curio cabinet into an integrated part of an educational system dedicated to teaching men how to live human lives and how to live them together on a world-wide basis. This is the great educational task of the future. The record of Field Museum in the last half century has laid the foundations of its leadership in the next.

RECENT ANTHROPOLOGY. II

By the late Professor FRANZ BOAS

MODERN anthropological literature shows that intimate observations on individual lives are felt to be essential for further progress, and new methods have been devised to obtain the needed information. Some of these methods seem to me of doubtful value. It is obvious that, setting aside laboratory experiment, the only way to obtain the necessary information is through a most intimate and long-continued life with the people and a perfect control of their language. These conditions are rarely attainable, or those who fulfil the practical needs are often in other ways not equipped to obtain the information we seek.

One of the methods used to overcome these difficulties is to induce natives to write or tell autobiographies. The better ones of these give us valuable information in regard to the struggles of everyday life and of the joys and sorrows of the people, but their reliability, beyond very elementary points, is doubtful. They are not facts but memories and memories distorted by the wishes and thoughts of the moment. The interests of the present determine the selection of data and color the interpretation of the past. Goethe called his autobiography Fiction and Truth, and this is true of the autobiographies of elderly persons. It is similar to what happens in telling a tale. Quite recently Lowie has published versions of a Crow tale, told at various times by the same individual, which show remarkable variations in plot and motives. I have published similar records of the same tale, retold by the same informant after an interval of nearly forty years, which show the stability of formal elements and the variability of motives. This is much more intensely the case in records of personal experiences. The same person has told me incidents of his own life at one time as simple, matter-of-fact occurrences, at other times as

supernatural experiences. The form given depends upon the state of mind of the recorder at the moment. I do not doubt that this happens often in regard to accounts of early supernatural experiences. Whenever a young man is required to have a supernatural experience, he will be ready to interpret a convenient event in the desired way, and in his memory it will assume ever-increasing importance. In his records personal likes and dislikes may also affect the presentation of events, inclusions or omissions of pertinent data. In short the tricks that memory plays us are too important to allow us to accept autobiographies as reliable, factual data. They are reflections of the facts as expressed in the present mental condition of the informant. Particularly in the case of the North American Indian the fundamental changes of life that have occurred during the past eighty years make it likely that customs that were at one time highly significant have lost or changed their meanings and are now reinterpreted according to the present state of mind of the informant. Autobiographies, on account of the restrictions just mentioned and of the difficulty of assembling a sufficient variety of individual records, are of limited value for the particular purpose for which they are being collected. They are valuable rather as useful material for a study of the perversion of truth brought about by the play of memory with the past. The rest is not much more than an account of customs collected in the usual way.

If we want to understand the individual reactions to cultural patterns we should rather pay attention to the events of daily life; not only to what people are doing but also what they are talking about. Conversations within the family, discussions among friends, gossip of the village offer an inexhaustible source of data showing the reactions of people to customary behavior and illustrating their individual standards. When a younger brother upbraids an elder brother because he is too lazy to provide for the needs of his family, but first apologizes because he dares to criticize an elder brother, light is thrown on the constitution of the family that can not easily be obtained in another way. The approval or disapproval of the behavior of a particular person and the reasons given for it, particularly disagreements in judgment, furnish us with illuminating information on aspects of the individual reactions to culture. Observations of this kind require, of course, much time and particularly adequate knowledge of the spoken language, but they seem to me indispensable for a clear understanding of the relation of the individual to the culture in which he lives. The variety of situations and the number of individuals observed is also much greater than can be obtained by any other method.

Other material may be furnished by folk-tales. Their plots are based explicitly or implicitly on judgments of behavior; therefore they are a fairly safe guide for judging the attitudes of the people for right and wrong, proper and improper behavior. To give an example: The extent to which parents are allowed to punish their children is a frequently exploited problem in the tales of the Northwest coast of America. A chief has the duty to see to it that his son purifies himself preparing for the quest of a vision, but when he strikes his recalcitrant son, so that he runs away, supposedly to commit suicide, the father is expelled by his tribe, presumably because he has caused the death of the chief's successor. In other tales, the reaction against overweening pride or the help given to the poor furnish material that may be compared with actual behavior.

The desire for understanding the dynamics of cultural change has also led to the study of those situations in which actual changes may be observed. This is particularly the case when different cultures come into contact and new adjustments are required. The results of acculturation have been the subject of historical studies. In the spread and development of western civilization from the times of the early Sumerians and Egyptians acculturation plays a most important role. The same is true in eastern Asia. Unfortunately most of the processes of acculturation that happen under our eyes are those of the destruction of simpler culture by the overwhelming force of western civilization. Where an actual amalgamation has occurred, as among Indians in Latin America and among Negro communities in the New World, we see only the results, little of the processes. The readjustments that occur in India, China and Japan in their contact with the western world are probably those in which the effect of conflict of modes of thought, feeling and action can be studied most advantageously. Less violent conflicts occur in the migration of Europeans to other continents and in the consequent formation of new cultural units. I do not think that we are as yet in a position to tell where the scattered data on personal adjustments or maladjustments, of conflicts between generations in a changing culture, of the formations of new forms that eliminate the original conflicts, may lead us and what methods are best adapted to clear up these manifold, complicated phenomena.

During the past decades psychologists and medical men have taken a keen interest in anthropological data and have made the attempt to transfer their methods of research directly to the study of social behavior. It seems to me that this has led to much confused thinking.

The tendency of modern psychology is to reduce

observations to quantitative values. Thorndike declared at one time that "whatever exists, exists in some amount and can be measured." This is true if we remember that the term "to measure" is used in a much broader sense than what we ordinarily mean by it. I can measure a rod one foot long and add another foot in length, but I can not add two amounts of intelligence and make it a double intelligence. This is still more true when comparing groups represented by averages. I have tried to explain this in our discussion of anatomical types. We may speak of degrees of difference, but these are not additive and require special definition. This fact has to be borne in mind in all observations on so-called quantitative data of variable mental phenomena. Before using them we must know the significance of our quantitative values.

Another precaution is essential. Psychological observations and conclusions are based essentially on experiences in our own culture. To a lesser extent this is also true of medicine, particularly in regard to psychiatry, which has shown the greatest interest in observations made on primitive people. It is, therefore, of fundamental importance to know in how far it is justifiable to transfer our methods and experiences to groups of different bodily build and of different culture and the vexed problem of what is due to nature and what to culture comes up in acute form.

First of all the naive assumption that any kind of difference in bodily form must necessarily be correlated with some kind of behavior can not be accepted as proved. We may grant that the fundamental constitution of the body of the individual is dependent upon the activity of the system of his glands or upon any other factors that affect the physiological functioning of the body and that this is a determinant of behavior, but we have no indication that such traits, like color of hair and eyes, form of hair, form of head or nose, are in any way closely related with mental traits. Even observations on general constitution do not indicate a close correlation between form and function. To a certain extent racial types may be compared with constitutional types. Negroes are more leptosome than East Asiatics. It is quite a different question whether this would mean that the Negro behaves more like the leptosomes among Europeans, the East Asiatic more like the pyknics. Considering the weakness of this correlation among the Europeans and the fact that the leptosomy of the Negro is due to the greater length of the limbs it seems more than doubtful whether any correlation exists.

Some of the difficulties of transferring the results of observations in our culture appear in one of the most widely exploited psychological tests, the intelligence test. Since it is primarily intended to serve practical purposes its method violates a general principle of scientific procedure. It combines a great many distinctive activities into one single picture, while in scientific procedure we try to isolate so far as possible each element and correlate the results only after each has been treated separately. While this objection holds good merely for the scientific exploitation of the collected test material it is much more important for our problem to remember that the material on which the ultimate conclusions are based are individual reactions to phases of our culture and that, therefore, the experience of the individual in regard to these phases plays an essential part in his responses. I believe nowadays this is fully recognized by psychologists. It follows that the more diverse the cultures the less can a test based on the form of our culture give us any valid clue to estimate the intelligence of members of an alien society.

I fear that up to this time no methods have been found to describe or evaluate innate intelligence and still less innate personality. We have to learn to place individuals in strictly analogous situations and observe their reactions; but how can that be done? We know that the general social experiences and habits of individuals in the same culture vary considerably and that they vary still more in different cultures. We learn from the results of psychoanalytic studies, no matter how doubtful most of their results may be, that early experiences have a deep effect upon later behavior. At present I should be more inclined to rely on observations on behavior in which traditional habits play a comparatively slight role or may be readily recognized. Intelligent behavior in the solution of difficult problems that arise in everyday life and choice in situations that admit of various solutions combined with a knowledge of customary habits of the people permit us to compare with a fair degree of certainty the behavior of alien people and our own. My judgment based on long and varied contact with so-called primitives gives me the impression that intelligence and personality, vague as these terms may be, are distributed in about the same way as among ourselves. I wish I could see a clearer way to give a definite answer to this problem, but as long as we are unable to analyze more clearly what is meant by intelligence and personality I fear that we shall not be able to give a more definite answer to these questions. By analogy based on the distribution of physiological reactions of the body, we may infer that there are not material differences between members of our own and alien societies.

Since the assimilation of the individual to culture

is a gradual process some light on the development of behavior may be obtained through the study of infants and older children and through behavior during adolescence. The results so far obtained are promising particularly in showing how the experiences of early childhood determine behavior, partly by unconscious imitation, partly by the kind of behavior expected from the children and impressed upon them by educational methods.

The desire for quantitative exactness has led to the attempt to utilize statistics of observations on behavior for the purpose of characterizing cultures as a whole and of determining the extent of individual variation. I confess that I have serious doubts in regard to the value of such statistics. In early years I have indulged in such statistics of the geographical distribution of tales and their variants. I still believe that the method may be of value in such cases when we are sure of what we are comparing. Unfortunately there are too many cases in which the comparability of material is so uncertain that a statistical comparison is not admissible. The fundamental demand for the applicability of statistical treatment must be that we are comparing classes of phenomena that belong together. When I wish to compare the health condition of two cities and base my conclusions on mortality rates without knowing the age distribution of the population I obtain a meaningless result. There are so many unknown elements involved in questionnaires and in the listing of specific forms of behavior that we are seldom sure what the answer means. I believe every one will agree that the answers to a Gallup poll depend both upon the selection of the public and the formulation of the question. An Indian whose economic security is endangered by his relation to Whites will be more apt to talk to a White man about these troubles than to his neighbor who wants to marry his daughter. The greater certainty of conclusions reached by such statistics is fictitious.

There is one more subject about which I ought to speak, that I take up with some hesitation. It is the psychiatric approach to anthropological data. I hesitate because I am unfamiilar with the curative value of processes the theoretical value of which seems to me very dubious. I can see that the expression of organic mental disturbances in different cultures will lead to different manifestations and that in this sense the study of abnormal mental behavior may be helpful to the student of mental diseases, but I think it is very unlikely that it will help us much in understanding the normal phenomena of culture. I believe particularly that the use of psychoanalysis for attacking the problems of primitive culture can not bear the light of a careful critical examination. I accept as an important contribution the effect of experiences in early life upon the personality of the individual, but when the attempt is made to explain mythology, totemism, taboo on the basis of psychoanalytic theories I can not follow. There are so many hypotheses involved in each step that it seems to me that the results can no longer be called scientifically sound.

Reviewing the development of anthropology as a whole I think we may rejoice in the many new lines of research that have been taken up. That many of the new methods need improvement is obvious but unavoidable in new, untested lines of approach. There is perhaps some danger that, engrossed in the difficult psychological problems involved in the analysis of culture, we may forget the importance of the general historical problem with which our science started, but I am certain that with the broadening of our view the varied approaches to an understanding of the history of mankind will be harmoniously elaborated and lead us to a better understanding of our own society.

OBITUARY

DEATHS AND MEMORIALS

DR. LOUIS B. WILSON, for twenty-two years director of the Mayo Foundation, Rochester, Minn., until his retirement in 1937, died on October 5. He was seventy-six years old.

DR. ELMER DARWIN BALL, Assistant Secretary of Agriculture under Presidents Woodrow Wilson and Warren G. Harding, died on October 5. He was seventy-three years old. Dr. Ball had been dean of the College of Agriculture of the University of Arizona and director of the agricultural experiment station. At the time of his death he was on leave as professor of zoology and entomology.

DR. LEO BUERGER, of New York City, surgeon and urologist, died on October 6 at the age of sixty-four years.

DR. ARTHUR T. EVANS, head of the department of botany at Miami University, died on October 6 at the age of fifty-five years.

DR. SAMUEL RUBEN, of the University of California at Berkeley, died on September 28 as the result of an explosion in the chemical laboratory. He was thirty years old. His work was in the field of photosynthesis and he was engaged on investigations with the Office of Scientific Research and Development.

DR. GEORGE ARNOLD BURBIDGE, dean of the Mari-

time College of Pharmacy, member of the faculty of Dalhousie University and a former chairman of the council of the Canadian Pharmaceutical Association, died on September 29. He was seventy-two years old.

A BRONZE plaque will be unveiled on Founders Day of Lehigh University on October 18 on the site of the first college Hydraulic Laboratory, which was built by Dr. Mansfield Merriman, formerly professor of civil engineering in the university.

THE California Academy of Sciences held a meeting on October 6 at the Medical Center in San Francisco of the University of California in recognition of the quadricentennial of Vesalius's great work, "De Humani Corporis Fabrica," which was published in 1543. The principal address was given by Dr. J. B. deC. M. Saunders, chairman of the department of anatomy, who spoke on "Andreas Vesalius, the Anatomist."

SCIENTIFIC EVENTS

PREFERENCE ORDER FOR REAGENT CHEMICALS

THE following preference rating order P–135 was issued on September 28 by the War Production Board.

(a) *Definitions for the purposes of this order:*

(1) "Reagent chemical" means any chemical prepared and packed for reagent use in laboratories.

(2) "Laboratory" means any person engaged in the business of carrying on scientific or technological investigation, testing, development or experimentation, to the extent that he is so engaged. The term includes research laboratories, production control laboratories, clinical laboratories and instructional laboratories. It does not include any person to the extent that he is engaged in the manufacture of products for commercial sale, even though the place in which the products are manufactured may be called a laboratory.

(3) "Distributor" means any person who buys reagent chemicals for resale without further processing.

(4) "Producer" means any person engaged in the production of reagent chemicals and includes any person who has them produced for him pursuant to toll agreement.

(b) *Assignment of preference ratings.*

(1) Preference rating AA–1 is hereby assigned to deliveries of any reagent chemical to any laboratory to which a serial number has been assigned under Preference Rating Order P–43, and to any laboratory owned and operated by the Army or Navy of the United States.

(2) Preference rating AA–2 is hereby assigned to:

(i) Deliveries of any reagent chemical to any laboratory to which a serial number has not been assigned under Preference Rating Order P–43.

(ii) Deliveries of any reagent chemical to a distributor or producer.

(c) *Application and extension of rating.* The preference rating assigned by paragraph (b) hereof shall, subject to the provisions of paragraph (d) hereof, be applied or extended only in accordance with the provisions of Priorities Regulation No. 3, as amended from time to time.

(d) *Restrictions on applications and extensions of rating.* The preference rating hereby assigned shall not be applied:

(1) To obtain deliveries of any reagent chemical or material:

(i) Which will be incorporated in, or which will enter into, any chemical reaction directly involved in the manufacture of any product, other than a reagent chemical, manufactured for sale;

(ii) Which will be used in the rendering of any service other than analytical, testing, control, educational or research laboratory services.

(2) To obtain deliveries during any calendar quarter of reagent chemicals, and material (not including maintenance, repair and operating supplies) which will enter, at any stage, into the production of reagent chemicals, greater in dollar value than the sum of the following:

(i) Twenty-five per cent. (25 per cent.) of the total dollar value of reagent chemicals and such material delivered, for analytical, testing, control or research purposes (exclusive of educational purposes) or for the manufacture of such reagent chemicals, to the person applying the rating hereby assigned during the twelve (12) month period ended September 30, 1942, and

(ii) One hundred per cent. (100 per cent.) of the total dollar value of reagent chemicals and such material delivered, for educational purposes or for the manufacture of reagent chemicals for such purposes, to the person applying the rating hereby assigned during such twelve (12) month period: *Provided, however,* That the dollar value of deliveries of reagent chemicals for educational purposes and of material which will enter into the production of reagent chemicals for educational purposes, to which such preference rating may be applied in any four successive quarters shall not exceed one hundred per cent. (100 per cent.) of the total dollar value of reagent chemicals and such material delivered for such purposes to the person applying the rating during such twelve (12) month period.

(3) If during any calendar quarter or other applicable period the dollar volume of production, services rendered, appropriations for research or number of students enrolled, by the person applying the rating hereby assigned, is greater than for the corresponding quarter or other period of the twelve (12) months ended September 30, 1942, the allowable dollar value to which the rating hereby assigned may be applied in terms of paragraph (d) (2), may be increased in proportion to the increase in production, services rendered, research appropriation or enrollment.

(4) The quantitative restrictions of CMP Regulations 5 and 5A shall not apply to deliveries of reagent chemi-

cals or of material (not including maintenance, repair and operating supplies) which will enter into the production of reagent chemicals.

(e) *Miscellaneous provisions:* (1) *Applicability of priorities regulations.* This order and all transactions affected hereby are subject to all applicable provisions of priorities regulations of the War Production Board, as amended from time to time.

(2) *Communications to War Production Board.* All communications concerning this order shall, unless otherwise directed, be addressed to: War Production Board, Chemicals Division, Washington, D. C., Ref.: P–135.

THE GUGGENHEIM LATIN AMERICAN FELLOWSHIPS

FIFTEEN fellowships have been awarded to Latin American scholars and artists in the fourteenth annual Latin American fellowship competition of the John Simon Guggenheim Memorial Foundation. The Latin American fellowships were established in the year 1929 by the late U. S. Senator Simon Guggenheim and by Mrs. Guggenheim as part of the activities of the foundation which they set up in 1925, in memory of a son. The Latin American fellows carry on their work in the United States.

The fellowships are granted annually to assist research and creative work in all fields of art and scholarship. The stipend is usually $2,000 for a year, plus sums for traveling expenses to the United States and return. The fifteen fellowships awarded this year are distributed as follows: three to Mexico, four to Argentina, two each to Brazil, Chile and Cuba, and one each to Peru and Puerto Rico. Two fellowships were granted to artists, two to economists, two to historians, one to a mathematician, one to a poet and seven to biologists. Fellowships in the sciences are:

José Antonio Goyco, assistant in chemistry, School of Tropical Medicine, University of Puerto Rico. *Project:* Studies in the field of food technology with special reference to high-yielding tropical crops. Mr. Goyco's work will be concerned with the production, processing and preservation of foods in the tropics as part of a hoped-for solution of the problem of a large undernourished population in the tropical belt of the world.

Mario Autuori, assistant in the Biological Institute, São Paulo, Brazil. *Project:* Studies of the biology of the fungus-growing ants. These ants are the chief enemies of Brazilian agriculture. Mr. Autuori's studies are designed to give fundamental bases for their control.

Dr. Isabel P. Farfante, instructor in zoology, Faculty of Science, University of Havana, Cuba. *Project:* Studies of methods of increasing the supply of edible mollusks and crustaceans in Cuban waters. This is Dr. Farfante's second Guggenheim Fellowship and she is the only woman appointed this year to a Latin American Fellowship.

Juan Ignacio Valencia, agrostologist, Darwin Botanical Institute, Buenos Aires, Argentina. *Project:* Continuation of studies of South American forage plants, especially corn, under the direction of Dr. Paul Weatherwax at the University of Indiana.

Raúl Cortés Peña, entomologist, Ministry of Agriculture, Santiago de Chile, and professor in the faculty of agronomy, Catholic University of Chile. *Project:* Continuation of studies of the methods used in the United States for the biological control of insect pests.

Dr. Gabriel Gasić Livacić, chief of the laboratory, Institute of Biology of the University of Chile. *Project:* Studies in the fields of hematology and endocrinology.

Dr. Fabio Leoni Werneck, chief of the laboratory, Instituto Oswaldo Cruz, Rio de Janeiro. *Project:* The preparation of a monograph on the Mallophaga of mammals. Dr. Werneck's work will be carried on in the U. S. National Museum and at Stanford University, California.

Jaime Lifshitz Gaj, research assistant in the Institute of Physics and professor in the faculty of sciences of the National University of Mexico. *Project:* Mathematical studies of the general theory of orbits, under the direction of Professor George D. Birkhoff at Harvard University.

The committee of selection consisted of Dr. Frank Aydelotte, director of the Institute for Advanced Study, Princeton, *Chairman;* Dr. Thomas Barbour, director of the Museum of Comparative Zoology, Harvard University; Dr. Percival Bailey, professor of neurology and neurosurgery, Medical School, University of Illinois; Dr. Américo Castro, professor of Spanish, Princeton University; and Dr. Elmer Drew Merrill, professor of botany and director of botanical collections, Harvard University. In making their selections, this committee was assisted by many eminent Latin American scholars and authorities in the fields of the applicants' work.

The foundation gives opportunities to men and women of the highest ability to further their work—assistance being available to scholars working in any field of knowledge and to artists working in any branch of the arts. They are open without distinction on account of race, color or creed to men and women, married or unmarried. They are granted only to persons who, by work accomplished, have already proved themselves to be of the highest ability. Normally the ages of the fellows are between twenty-five and forty years.

GRANT TO THE NATIONAL RESEARCH COUNCIL FROM THE JOHNSON AND JOHNSON RESEARCH FOUNDATION

DR. ROSS G. HARRISON, chairman of the National Research Council, announces the acceptance by the National Academy of Sciences—National Research Council of a grant from the Johnson and Johnson Research Foundation in the amount of $75,000. The grant was made to enable the Division of Medical Sciences of the council, under the chairmanship of Dr. Lewis H. Weed, to gather current medical infor-

mation pertaining to the war effort and to disseminate summaries. The program of the Division of Medical Sciences of the National Research Council contemplates coverage of the various medical reports and bulletins which emanate from civilian and military activities throughout the world. The enterprise should fill a much-needed gap in the war effort in medicine; for one of the greatest difficulties encountered in medicine to-day lies in providing adequate up-to-date information to the medical officers of the armed services both in this country and abroad and in making the experience of war medicine available as far as possible to civilian physicians.

The Johnson and Johnson Research Foundation appropriation to the National Research Council becomes immediately available; in accordance with present plans it will be utilized in the period up to June 30, 1945. A central office will be established in Washington and reporters will be appointed in various foreign countries, so that a staff of special observers abroad will be working under the direction of the central office. The various theaters of operation present medical problems in which climate, season of year, distribution of insects and distribution of disease all play different roles. Reports from widely separated parts of the world will be of the greatest medical importance and it is hoped that out of the combined efforts much of significance will be achieved.

Many of the observations and laboratory studies can not be released at present because of the classified information contained in them—information of military importance. Such materials will be carefully held until release may be made. Every effort will be made, however, to issue bulletins containing current advances in medical practice and medical research which are not military secrets and which should be made available to the medical profession at the earliest possible date. This collection will form basic source material for later summaries of medical experience in the present world war. Not only data from the armed forces will be included, but also material from other federal agencies and from civilian enterprises.

The informational service will be under the direction of the committee on information of the Division of Medical Sciences, which includes Dr. Morris Fishbein, *Chairman,* Dr. John F. Fulton, Dr. Richard M. Hewitt and Dr. Robert N. Nye, with liaison officers appointed by the three Surgeons General.

The Johnson and Johnson Research Foundation was established on January 1, 1940, as a non-profit philanthropic organization by Johnson and Johnson, New Brunswick, N. J., with the express purpose of supporting research and development of products to serve the medical profession. It has made appropriations for both fundamental and developmental investigations and is currently sponsoring about a hundred projects in twenty-eight universities. The fields of medical interest which have largely been supported are pharmacology (including antiseptics), allergy, physiological studies in pediatrics and human fertility.

SCIENTIFIC NOTES AND NEWS

THE Earl of Athlone, chancellor of the University of London, conferred the honorary degree of doctor of laws on President Roosevelt on August 25 on the occasion of his recent visit to Ottawa. The oration was read by Captain C. H. Best, professor of physiology at the University of Toronto.

AT a recent meeting of the Cancer Advisory Committee a portrait of himself was presented to Dr. Carl Voegtlin, who resigned recently as director of the National Cancer Institute of the U. S. Public Health Service.

A BUST of Albert Einstein, one of four replicas, has been presented by George Haight to the regents of the University of Wisconsin.

RAPHAEL L. STERN, chemical superintendent of the Parlin plant of the Hercules Powder Company, known for his adaptation of wood pulp in the manufacture of smokeless powder, which has increased the output of explosives, was awarded on October 4 a citation by the Ordnance Department of the United States Army for "distinguished service to his country."

DR. HAROLD GRAY, technical supervisor of the tire division of the B. F. Goodrich Company, Akron, Ohio, has been elected chairman of the rubber division of the American Chemical Society. He succeeds Dr. John T. Blake, chief chemist of the Simplex Wire and Cable Company, Cambridge, Mass. Dr. W. A. Gibbons, of the United States Rubber Company, New York City, has been chosen vice-chairman.

HAROLD F. HAMOND, director of the traffic and transportation division of the National Conservation Bureau, has been elected president of the Institute of Traffic Engineers.

SIR STANLEY WOODWARK has been elected Master of the Society of Apothecaries of London for the third consecutive year; Dr. J. P. Hedley has been elected senior warden and Dr. Hugh F. Powell junior warden.

DR. DONALD HUNTER COOK, of the School of Tropical Medicine, San Juan, Puerto Rico, has been appointed visiting professor of chemistry at Columbia University.

DR. E. L. STOVER, head of the department of botany

of the Eastern Illinois State Teachers College at Charleston, is spending the current academic year at the University of Illinois as visiting professor of botany. Professor Stover, who is chairman of the Committee on Instruction in the Biological Sciences of the National Research Council, will have charge of the beginning courses in botany.

AFTER fifty years of academic service Dr. Henry E. Crampton has retired with the title of emeritus professor of zoology of Columbia University. The authorities of the American Museum of Natural History have provided him with facilities to continue his researches on the distribution, variation, evolution and heredity of gasteropod mollusca, especially in Partula and in Lymnaea. Dr. Crampton has made several expeditions to the South Seas for the collection of series of individuals of the species of Partula, having about 250,000 individuals of that genus. Three volumes of the results of his work have appeared, and the material for still others is undergoing preparation.

DR. E. O. ESSIG, professor of entomology at the University of California at Berkeley and entomologist of the Agricultural Experiment Station, has been appointed head of the division of entomology and parasitology. He has served as acting head of the division since February 17.

DR. HAROLD WILLIAM BROWN, who has returned from the Virgin Islands, where he spent some time working on filariasis, has been made professor of parasitology at Columbia University. This appointment marks the beginning of a new program in tropical medicine at the Columbia-Presbyterian Medical Center. Dr. Brown is the first member of a faculty for training and research in tropical diseases which will function under the immediate direction of the DeLamar Institute of Public Health, a division of the Medical School. This program has been made possible by a grant from the Josiah Macy Jr. Foundation. The personnel of the new department probably will not be completely assembled until after the war.

WALLACE WORZELLA, of Purdue University, has become head of the department of agronomy at South Dakota State College at Brookings.

DR. STANLEY WAWZONEK, of the department of chemistry at the University of Illinois, has been appointed instructor at the University of Tennessee to take the place of Dr. R. C. Millican, who has resigned to study medicine at the University of Tennessee Medical College at Memphis.

DR. J. HAROLD SMITH, instructor in chemistry at the University of Illinois, has been appointed associate professor of chemistry at Massachusetts State College.

THE university correspondent of *The Times*, London, reports that during the war many of the professorial chairs in the universities have become vacant and the elections to them have been held in suspense by the council of the Senate. The whole situation was discussed by the Regent House last November; and in the Lent term of this year nineteen vacancies were considered by the faculty boards and other bodies. In several cases, where the reason for it has ceased, the suspension has been terminated by grace; and since the beginning of the Easter term the following elections have been made at the University of Cambridge: to the Sir William Dunn professorship of biochemistry, Dr. Albert Charles Chibnall, Clare College; to the professorship of mechanical sciences, Dr. John Fleetwood Baker, Clare College; to the Arthur Balfour professorship of genetics, Dr. Ronald Aylmer Fisher, Gonville and Caius College; to the Quick professorship of biology, David Keilin, fellow of Magdalene College (re-elected), and to the Woodwardian professorship of geology, Dr. William Bernard Robinson King, fellow of Magdalene College.

LEWIS S. MUNSON, who, as production superintendent and later plant manager of the du Pont Dye Works, played an important part in building the American dye industry, has retired at the age of seventy years. He had been connected with the du Pont Company since 1918.

DR. GEORGE M. REED, curator of plant pathology at the Brooklyn Botanic Garden, has been appointed acting director of the garden. He will fill the vacancy caused by the death on August 9 of Dr. C. Stuart Gager.

DR. FRED J. SEAVER has been appointed head curator at the New York Botanical Garden to succeed Dr. H. A. Gleason, who has retired to devote himself more completely to research. Dr. Gleason will remain as curator and assistant director. Dr. Seaver is managing editor of *Mycologia* and has been on the staff of the garden since 1908.

ALDEN H. EMERY, assistant manager, has been made acting secretary and acting business manager of the American Chemical Society during any absence of Dr. Charles L. Parsons, secretary and business manager of the society.

DR. MELVILLE H. MANSON has been appointed medical director of the American Telephone and Telegraph Company to succeed Dr. Cassius H. Watson, who retired on October 1. Dr. Manson has been medical director of the New York Telephone Company since 1942 and was formerly medical director of the Bell Telephone Laboratories.

JOHN A. HUTCHESON, engineering manager of the Baltimore Radio Division of the Westinghouse Elec-

tric and Manufacturing Company, has been appointed associate director of the Westinghouse Research Laboratories. He will direct wartime micro-wave research, but his work will include all phases of research engineering.

DOUGLAS G. WOOLF, after serving for twenty-seven years, has resigned as editor-in-chief of the *Textile World*, to become vice-president and director of information of the Textile Research Institute, Inc.

DR. V. A. TIEDJENS, associate olericulturist at Rutgers University and the New Jersey Agricultural Experiment Station, returned on September 27 from the islands of Aruba and Curaçao, where he conducted a survey to determine the possibilities of growing perishable foods on the islands. He was sent at the request of the Standard Oil Company of New Jersey. While on the islands he was assisted by officials of the company as well as by R. J. Beaujon, director of the Department of Landbau, Veedeelt and Visschery, of the Netherlands West Indies Government. Due to the scarcity of soil and fresh water on the islands the possibility of using soilless culture methods to grow food plants was given serious consideration.

DR. R. B. STEVENS, now on leave from Birmingham-Southern College, has been commissioned Second Lieutenant in the Sanitary Corps of the Army.

MISS ELIZA HIRSCHHORN, of the faculty of the National University of Argentina, is visiting the United States. She plans to work for an advanced degree in agriculture and to engage in research on smuts. Miss Hirschhorn holds a research fellowship at Washington State College.

DR. PARKER D. TRASK, geologist with the U. S. Geological Survey, gave before the section of geology of the New York Academy of Sciences on October 4 an illustrated address entitled "The Mexican Volcano Paricutin, and its Geologic Setting." He gave a first-hand description of the remarkable new volcano, which suddenly appeared on February 20 and has already grown to a height of nearly 1,000 feet.

THE British Broadcasting Corporation has arranged a series of twelve weekly talks on applied physical science, which began on October 1, under the title "Science at Your Service." An attempt is to be made to bring before the layman the numerous ways in which physical science is being used in everyday life and to show that an understanding of the principles of science is essential in the post-war world. The addresses will deal with the home, building construction, plastics, clothing and fabrics, explosives, the structure of the earth's crust, the weather, planning fisheries, life-saving at sea, shipbuilding and tunnelling. It is expected that the speakers will include Sir Lawrence Bragg, Sir Edward Appleton, Sir George Burt and Sir Charles Darwin.

THE annual joint meeting of the Institute of Medicine of Chicago and the Chicago Society of Internal Medicine will be held at the Palmer House on Monday evening, October 25, when Dr. Conrad A. Elvehjem, professor of biochemistry at the University of Wisconsin, will lecture on "The Nutritional Significance of the Newer Members of the Vitamin B Complex."

A JOINT FUELS CONFERENCE of the American Institute of Mining Engineers and the American Society of Mechanical Engineers will be held at the Hotel William Penn, Pittsburgh, on October 28 and 29.

THE annual meeting of the American Dental Association was held at the Netherland Plaza Hotel, Cincinnati, from October 11 to 13. Because of wartime conditions, the meeting was limited to the transaction of essential business by the house of delegates, with no program of scientific papers or clinics.

THE twenty-third annual meeting of the Highway Research Board will be held this year from November 27 to 30 at the Edgewater Beach Hotel, Chicago. The first two days will be devoted to meetings of the various committees and departments. Sessions of the board for the presentation and discussion of papers relating to highway finance, economics, design, materials, construction, maintenance, traffic and soils investigations will be held on November 29 and 30.

THE South Eastern Pennsylvania Section of the American Chemical Society will meet at Lancaster, Pa., on October 21.

AT the celebration of the golden jubilee of the medical school of Tufts College, President Leonard Carmichael announced that a gift of $125,000 had been made to the building fund.

A BEQUEST has been made to the University of Michigan, in the will of the late John H. Darling, of Duluth, Minnesota, amounting to over $25,000. It will be added to the Mortimer E. Cooley Foundation of Engineering.

THE University of Texas Chapter of the Phi Beta Pi Medical Fraternity has given funds to the Medical Branch of the University of Texas at Galveston for the purpose of establishing an annual lectureship.

THOSE engaged in production of iron and steel who are eligible to use the maintenance, repair and operating supplies preference ratings assigned by Preference Rating Order P-68, the W.P.B. rules, may use the AA-1 rating assigned by it to obtain laboratory instruments and equipment. This is an amendment to Priorities Regulation 3, issued September 27.

DISCUSSION

AMERICAN STANDARD LETTER SYMBOLS FOR HEAT AND THERMODYNAMICS

THERE recently has been issued by the American Standards Association, 29 West 39th Street, New York City, "Letter Symbols for Heat and Thermodynamics Including Heat Flow," Z10.4–1943, price 55 cents. This is in continuation of a project initiated some years ago—"Standardization of Scientific and Engineering Symbols and Abbreviations"—under the sponsorship of the American Association for the Advancement of Science, the American Institute of Electrical Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers and the Society for the Promotion of Engineering Education; to be carried out under the procedure of the American Standards Association.

As a result, there were issued lists of American Standard Symbols in a number of fields. Some recently have been revised and re-issued: "Letter Symbols for Hydraulics," ASA Z10.2–1942, price 35 cents; "Letter Symbols for Mechanics of Solid Bodies," ASA Z10.3–1942, price 25 cents; "Illuminating Engineering Nomenclature and Photometric Standards," ASA Z7.1–1942, price 25 cents; and now the Thermodynamic Symbols above mentioned. Other revised lists of previously issued standards and some new lists are in progress.

A letter symbol is defined as "a single character, with subscript or superscript if required, used to denote a physical magnitude in mathematical equations and expressions." A person who uses thermodynamics, or any other engineer or worker in applied sciences, has an infinite number of problems, each in the content of his own rapidly expanding specialty. So he can concentrate his brains on his specialty, if mathematics and symbols are standardized so as to be labor-saving tools. Then he doesn't need to spend mental effort on the language or form of a formula, but only on its underlying principles.

The most important way in which this standardization helps scientists and engineers is the arrangement that all authors writing on a given subject shall use the same meanings for the letter symbols in their formulas. For example, D in a formula always denotes "Diameter." Readers readily learn such a set of standard symbols when the same ones are used in all publications, and are thereafter saved an appreciable amount of mental effort.

At the present time a university student who may be taking courses in engineering thermodynamics, physical chemistry, theoretical chemistry and chemical engineering usually finds an entirely different set of symbols used for given concepts in each of the fields mentioned. The mental readjustment that is required each time a student starts a new recitation gives a handicap which symbols standardization eliminates.

A completely logical list of symbols would have a single symbol for every concept, no matter in what field it might be used, and would have all symbols selected on a sound theoretical basis, regardless of present usages. But in default of an International Dictator to enforce such an allegedly logical list, it just wouldn't be accepted. Lots of symbols lists have been set forth by committees who proposed to reform symbols usages, which have accomplished nothing beyond collection of dust on volumes of "Proceedings" in technical libraries. But we expect that the American Standard lists of letter symbols are going to merit actual use, and so we have tried to make a realistic compromise between existing usages, and idealism.

INTERNATIONAL SYMBOLS STANDARDIZATION

In many cases letter symbols are the initial letters of names. The fact that different languages use different names has started the use of completely different letter symbols for the same concept in nations using different languages. For this reason, international standardization of symbols for all fields of science and technology seems impossible at the minute. However, in the case of people using the English language, the possibilities are much brighter.

At the present time, even though people in the United States, Canada, England and other parts of the British Empire speak nearly the same language, there is great diversity in the letter symbols used in textbooks and other scientific publications. This is in spite of the fact that books published in each nation are used freely in the other, that colleges exchange students, and that commercial concerns in each country have affiliates overseas. Hence, standardization by both nations in cooperation would be very advantageous.

With this in mind the Royal Society of England arranged that the British Standards Institution start collaboration on lists of letter symbols for the English language, with other Empire standards associations, the Canadian Engineering Standards Association and the American Standards Association. The two latter bodies accepted the proposition.

The writer was in England in 1938 as delegate to a meeting at Torquay of the International Electrotechnical Commission, where symbols for electrical quantities were pretty well settled internationally. While in England the writer participated in the above-mentioned arrangements for symbols for the English language for other fields, and definite progress was made in this direction. However, the impact of war on England presently compelled postponement of the

project there. The American and Canadian Standards Associations have continued, with such information about the English point of view that it is hoped that the ASA lists being issued will require but little addition when letter symbols for the English language again come to be considered. Furthermore, the American lists will give standards for our use until this happy time comes, and will furnish a definite statement of the American point of view when it does come.

Further information about the details of the American Standards Association symbols project, with reasons for the selections in particular cases of the symbols for heat and thermodynamics, are given in articles appearing in the September issues of *Mechanical Engineering,* published by the American Society of Mechanical Engineers, the *American Journal of Physics* and *Industrial Standardization.*

SANFORD A. MOSS

GENERAL ELECTRIC COMPANY,
WEST LYNN, MASS.

A TEXAS SKELETON

HIGH water on June 24 caved off the nearly vertical bank of the Brazos River sixty miles northeast of Abilene, Texas, and exposed a flexed human skeleton at a depth below the present soil surface of twenty-one feet. The top of the bank at the site is thirty-two feet above low-water level; and the bands of silt formation above the grave are regular and unbroken for considerable distances on each side and above the burial. Where the burial was made the silt banding rises to a somewhat higher level than the same bands do a short distance above and below it. Evidently burial was made in a shallow grave on a slightly higher point along the river bank and subsequently twenty-one feet of river silt has covered the whole valley floor. There were no stones, shells or artifacts in the grave. The head was buried a little higher than the body, which lay flexed on the left side, and surrounded by ashes and charcoal. The bones are hard and evidently somewhat mineralized.

The skull was exposed by high water and most of the hand bones—the hands were usually placed on each side of the face in Abilene region flexed burials—were washed away. Part of the skull top and the left side of the skull were also washed away. The frontal bone, the lower jaw and teeth, and the right side of the skull and other parts were found still embedded in the bank eleven feet above low-water level by a boy swimming below it. The boy, James Putnam, and a companion dug out the remaining skull bones with pocket knives; and his uncle, J. C. Putnam, took them sixty miles to Abilene on the 26th. Mr. Putnam has watched the river banks for bones ever since 1929, when the writer excavated two peculiar skeletons buried six and a half feet deep in a Brazos River bank.[1, 2]

In 1939 Mr. Putnam had also brought information of the washing out of another skeleton in a river bank near by at below nine feet from the soil surface.[3]

On June 27 the writer and a local geologist, H. H. Adams, went to the site, photographed the plainly seen skull mold, and with the assistance of J. C. Putnam and James P. Putnam, the ranch owners, excavated the remainder of the skeleton, which lay farther back in the bank. The condition of the caving bank did not justify delay and another rise might have removed the bones.

Most of the long bones were found, and these have some peculiar curvatures and torsions, which call for careful study. On the skull the brow ridges are thick, and the upper portion of the frontal bone near the articular surface is more than three eighths of an inch thick.

There is a thick stratum of ashes eight feet beneath the burial which bands the bank for a considerable distance, but whether this is due to human or natural agencies is not yet known. This burial is far deeper than any previously found in the Abilene region.

Dr. Frank H. H. Roberts, Jr., of the Bureau of American Ethnology, was asked to inspect the site, and he came on July 7 and remained five days studying the burial site and also many other deeply buried midden strata in various stream banks of the Abilene region. The skeleton will be sent to Dr. Roberts at the Smithsonian Institution for scientific study.

CYRUS N. RAY

ABILENE, TEXAS

TRANSLITERATION OF ENGLISH NAMES INTO RUSSIAN

IN the September 3d issue of SCIENCE, there is a note by the late Aleš Hrdlička on the transliteration of English names into Russian. The author states, quite rightly, that there is no "w" in Russian, and that this sound in his opinion should be represented by "v," while Russians in general represent it by "u," the examples mentioned being "Wendell Willkie" and "New York." Possibly there are some who do transliterate Willkie as Uillkie, but it is far from general. For instance, in the Russian newspaper, "Novoye Russkoye Slovo," published in New York, this name is transliterated as "Vilki." "W" in this first example sounds more like "v" than "u." In the second example, in "New York" "w" sounds more like "u," and so it is usually transliterated as "Niu." The use of "v" in this word would make it sound like

[1] Cyrus N. Ray, *Scientific American,* May, 1929.

[2] J. Alden Mason, *The Museum Journal,* September-December, 1929, The Museum of The University of Pennsylvania.

[3] Cyrus N. Ray, Plate 52, *Bulletin* of Texas Archeological and Paleontological Society, Vol. 11, 1939.

"Nev," which would not correspond to the pronunciation of the word at all.

As for the "h" sound, if one would only take the trouble to look to page 344 in Alexandrow's dictionary, which is probably the most complete Russian-English and English-Russian dictionary, one would see that the word "hall" mentioned by Aleš Hrdlička is transliterated as "hol" and not "gol," along with a score of other words containing the same letter "h."

As for the English "sh," no Russian would ever use "š" as suggested by Hrdlička, since there is no letter "š" in Russian. This letter appears in the Czech language and possibly a Czech might use it, but certainly not a Russian. To do such a thing for a Russian would be similar to a case of an American wanting to use some Chinese or Hebrew letters in transliterating Russian names into English. In transliterating names like "Shaw," the sound "aw" is sometimes transliterated as "ou."

No matter how carefully one tries to transliterate English names into Russian, it can not be done exactly, as there are many English sounds that have no corresponding ones in Russian and *vice versa*. Some Russian scientific publications follow the practise of retaining English names in their original form, printing them in Latin letters. This is an exact method, which leaves no room for any distortions or ambiguities. I believe that, if this practice is more generally used, it might prove to be the best and simplest way of solving this problem.

VALENTINA KROTKOV
QUEEN'S UNIVERSITY, KINGSTON, ONT., CAN.

SCIENTIFIC BOOKS

TROPICAL DISEASES

Stitt's Diagnosis, Prevention and Treatment of Tropical Diseases. By RICHARD P. STRONG. 1747 pp. Philadelphia: The Blakiston Company. $21.00.

STITT'S "Diagnostics and Treatment of Tropical Diseases" went through five editions under the able authorship of Rear Admiral E. R. Stitt, Medical Corps, U. S. Navy. The first edition appeared in 1914 and the fifth in 1929. The sixth edition of this well-known American text-book of tropical medicine was published in 1942, and reprinted after further revision in 1943 under the authorship of Dr. Richard P. Strong.

The increase in knowledge of tropical and parasitic diseases accumulated in the twelve years intervening between the appearance of the fifth and sixth editions, together with the obvious needs for providing more detailed information concerning the epidemiology and methods of control of communicable diseases, necessitated enlargement to two volumes.

As is pointed out by Rear Admiral E. R. Stitt in the foreword, Dr. Richard P. Strong brought to the task of revision an unusually broad experience in tropical medicine in many parts of the world. His post as president of the Army Tropical Disease Board in the Philippines; professor of tropical medicine at the University of the Philippines, and subsequently at Harvard; his activities as chairman of Red Cross Commissions for the investigation of pneumonic plague in Manchuria, typhus fever in the Balkans and trench fever in France during the first World War, and his expeditions to Africa, the Amazon and other areas of Central and South America have equipped him with intimate personal knowledge of the field problems in many aspects of tropical medicine. His own investigations in the dysenteries, plague, trypanosomiasis, bartonellosis and onchocerciasis have constituted important contributions to our knowledge of these diseases and likewise have provided a critique for his treatment of the whole field of tropical medicine. This unusually rich personal experience is amply reflected throughout the book.

The text is arranged in a series of Sections. Section I deals with "Diseases Due to Protozoa"; Section II—"Diseases Due to Bacteria"; Section III—"Diseases Due to Filterable Viruses, Rickettsiae and Allied Organisms"; Section IV—"The Nutritional Disorders"; Section V—"Diseases Not Included in Other Categories," including effects of heat, tropical ulcer, granuloma venereum, climatic bubo and other rarer conditions; Section VI—"Diseases Due to Fungi and Poisonous Plants"; Section VII—"Diseases Due to Animal Parasites," including the role of arthropods in the transmission of disease, poisonous snakes and lizards, fish and coelenterates; Section VIII deals with general considerations of medical practice in tropical areas.

Following the text is an appendix which presents an index to clinical diagnosis, alphabetically arranged, an index of laboratory diagnostic procedures and a section on personal hygiene, tropical hygiene and sanitation.

The sections devoted to descriptions of the particular diseases constitute excellent presentations of the most authoritative data in sufficient detail to make this an excellent reference work, as well as an essential volume for the practitioner of clinical medicine in the tropics.

The selected bibliography which follows each section provides a list of the more important fundamental articles dealing with the subject which adds greatly to the value of the book as a whole. Although it is difficult to single out particular sections, the presen-

tation of malaria, dysenteries, the rickettsiae, plague, cholera, trypanosomiasis and the filarial diseases are noteworthy. The section on tropical hygiene and sanitation and the consideration of the general medical problems presented by practice in the tropics contain much useful information for individuals lacking special training. The index of clinical diagnosis and laboratory diagnosis are likewise useful for quick reference.

The two volumes are well printed and profusely illustrated with excellent and well-selected photographs and drawings. There are surprisingly few typographical errors.

This second printing of the sixth edition constitutes an outstanding contribution to the literature on tropical medicine. It provides an enormous amount of detailed information on many subjects and is an essential and practical text, both for the student and the practitioner in this field. There is no other single work which approaches the usefulness of this text.

THOMAS T. MACKIE

STATISTICAL TABLES

Statistical Tables for Biological, Agricultural and Medical Research. By RONALD A. FISHER and FRANK YATES. Second edition. viii + 96 pp. London: Oliver and Boyd, Ltd. 1943.

IN the past five years no book in my possession has had more constant use than the first edition of these tables. It has furnished in compact form the data needed in designing an experiment, computing its results and interpreting the statistics obtained by analysis. The second edition, therefore, is as welcome as an old friend.

Four new tables have been added, each with an explanatory introduction. Table V_1 by P. V. Sukhatme is based upon a compound of two student distributions and gives the Behrens-Fisher test at the five and one per cent. levels for the significance of the difference between two means. It applies where the variances estimated from two series differ significantly, so that they can not properly be pooled for the usual t-test of their means. Table V_2 expands the test at one limit of Table V_1, for comparisons where one variance is determined from a large number of observations and conforms to the normal distribution and the other, differing from it significantly, has been computed from a small series of Student's type. It may be noted, however, that the adequacy of the Behrens-Fisher test has been questioned by some mathematical statisticians who accept the rest of the book.

Table $VIII_1$ by W. L. Stevens gives the lower and upper limits of the expectation for the binomial and Poisson distributions at probabilities of .005, .025 and .1. If an event is observed to occur from 0 to 15 times (= a) in N trials, where N varies from 2a to ∞, the table gives directly for each probability the expected number of occurrences with which the observation is compatible. With Table $VIII_2$, also by Stevens, the experimenter can estimate the density of organisms in a culture and the variance of the estimate from the incidence of sterile and fertile tubes in two-fold, four-fold and ten-fold dilution series.

Modern experimental technique has been greatly strengthened by designs known as balanced incomplete blocks. Experimenters are well aware of the increase in precision when treatments can be compared on the same animal or plant or on litter mates or on smaller, more homogeneous areas of land. The designs shown in an expanded Table XVII enable the experimenter to compare many treatments with the precision formerly possible only when treatments were few or when one treatment in each small unit was allotted to a "control" or standard with the corresponding loss in efficiency. Answers are given for four of the "cases not yet solved" in Tables XVIII and XIX of the first edition and the introduction for this group of tables has been rewritten to include the Youden square and to describe the newer methods of analysis for recovering the information between as well as within blocks.

The new edition omits the description of how the tables of random numbers were prepared and checked, and other smaller changes are scattered through a very informative introduction. The references have been extended to a list of thirty. Errata for the first edition, all of which have been corrected in the second edition, follow the table of contents.

Other tables in the book are unchanged. These include with suitable introductions the normal distribution; the distribution of t and χ^2; z and the variance ratio (Snedecor's F) at four levels of significance; the correlation coefficient at different levels of significance and degrees of freedom; the transformation of r to z; tests of significance for 2×2 contingency tables; the probit and angular transformations and the terms needed in obtaining maximum likelihood solutions with them; an adequate series of Latin squares and complete sets of orthogonal squares; normalizing scores for ranked data to facilitate their use in the analysis of variance; initial differences of powers of natural numbers; orthogonal polynomials for fitting equations of the first to the fifth degree; common and natural 5-place logarithms; squares, square roots, reciprocals, factorials and selected trigonometric functions; six pages of random numbers and a concluding table of miscellaneous constants.

Additions that would be welcome in a third edition may be suggested. Since few biologists take readily to interpolation, several tables could be expanded to

advantage. Thus the variance ratio might be given for more intermediate degrees of freedom, the angular transformation assigned a more detailed table and Tables VIII and XI expanded. Useful new tables could include tests for the significance of runs; the range of the normal distribution in different-sized samples at various levels of significance, in terms of the standard deviation computed with varying degrees of freedom; other terms of value in statistical control of quality; and criteria for identifying discordant observations. These omissions, however, are not vital. The appearance of a second edition on good paper, in the same convenient format as before and with as many additions as have been made, must rank as a real achievement under present war conditions.

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CONNECTICUT AGRICULTURAL EXPERIMENT STATION

SPECIAL ARTICLES

A PROTECTIVE ANTISERUM AGAINST MOUSE PNEUMONITIS VIRUS[1]

A VIRAL agent causing pneumonitis in mice has been isolated in this laboratory on two occasions, in 1938[2] and in 1940, by intranasal "blind passage" of the normal appearing lungs of white mice. A general study[3] of its properties indicates that it is similar if not identical to certain other latent pneumotropic viruses found in mice.[4] The morphology of its inclusion bodies, as seen in sections of mouse lungs, and of its elementary bodies, as revealed by smears of mouse lung or infected chick embryo yolk sac, relate it very definitely to the viruses of psittacosis, other ornithosis strains, lymphogranuloma venereum, meningopneumonitis, trachoma, inclusion conjunctivitis and others. Some cases of primary atypical pneumonia of man are related to agents within this group.[5]

Although the serum neutralization test is applicable to the study of most viruses, difficulty has been encountered in the use of the test in this group of agents. Repeated attempts in this laboratory to induce neutralizing antibody in the rabbit against the mouse virus have failed. In general, it has been the experience of other investigators that infection or artificial immunization of animals with these agents gives rise to neutralizing antibody only to a slight extent or not at all. Similar results have been obtained with convalescent human serums, although exceptions are found in some of the reports regarding lymphogranuloma venereum serum,[6] and in the demonstration of neutralizing antibodies in monkey and human serums after artificial immunization with psittacosis virus.[7]

TABLE 1

COMPARATIVE SERUM NEUTRALIZATION TESTS ON RABBIT AND CHICKEN SERUMS

Serums	L_{D50}*	Average infectivity scores† at virus dilutions								
		10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	10^{-8}	10^{-9}
Normal rabbit	$10^{-3.60}$	5.00	5.00	5.00	3.5	1.83	1.00	.67	.00	
Immune rabbit	$10^{-3.25}$	5.00	5.00	4.33	1.33	1.00	1.00	.00	.00	
Normal rooster	$10^{-4.50}$	4.83	4.83	5.00	5.00	3.00	1.20	1.00	.33	.00
Immune rooster	$>10^{-1}$	2.00	1.00	1.00	.33	.00	.00	.00	.00	

Three-tenths cc volumes of the serums were added to equal amounts of virus dilutions. Infected mouse lung served as antigen in the rabbit serum test, and infected yolk sac with the rooster serum. After standing at 20° C for 1 hour, 0.03 cc from each tube was instilled intranasally into each of 6 mice. Mice were observed daily and survivors were autopsied on the 10th day.

* The 50 per cent. mortality dose computed according to the method of Reed and Muench (L. J. Reed and H. Muench, *Am. Jour. Hyg.*, 27: 493, 1938) from the record of deaths not included here.

† Computed by the method of Horsfall (F. L. Horsfall, *Jour. Exp. Med.*, 70: 209, 1939) which gives a numerical value to the amount of infection as determined by the extent of lung consolidation.

Recognizing the similarity of our mouse virus to the several strains infecting birds, we investigated the ability of chickens to produce antiserum against this virus. Repeated injection of infected mouse lung emulsion into roosters resulted in the appearance of neutralizing antibody of relatively high titer. Parallel inoculations of rabbits were made, but only traces of antibody were produced. The immunizing procedure for both species was the same and consisted of a series of 25 intraperitoneal and 3 intramuscular injections of mouse lung virus over a period of 15 weeks.

[1] This investigation was supported by the John Rockefeller McCormick Memorial Fund of the University of Chicago.

[2] F. B. Gordon, G. Freeman and J. M. Clampit, *Proc. Soc. Exp. Biol. and Med.*, 39: 450, 1938.

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Table 1 shows the results of neutralization tests in which a specimen of serum taken after the period of immunization is compared with serum from the same animal before immunization. Considerable protection was afforded by the immune chicken serum as shown by survival of all mice (L_{D50} of virus = $> 10^{-1}$), and much less extensive lung involvement than was seen in the controls. The protective effect of immune rabbit serum was very slight.

In the tests with chicken antiserum, virus propagated in the yolk sac of the chick embryo was used instead of mouse lung virus to avoid any non-specific effects due to antibody against mouse lung tissue. However, in one test neutralization occurred to the same degree when mouse lung virus was used with the chicken antiserum, and although flocculation occurred in the tubes containing low dilutions of serum, this did not appear to influence the result of the test. No flocculation was observed when rabbit antiserum was mixed with mouse lung virus.

The results recorded in Table 1 suggest that there is a distinct advantage in using the chicken as a source of antibody against this agent. Whether this advantage is due to a greater susceptibility resulting in an unrecognized infection, or whether other factors are responsible, we do not know. Several reports[8] have appeared recently suggesting that chicken serum has certain advantages over other types of serum for various purposes.

The anti-mouse virus chicken serum reacts also with egg-propagated virus to give a visible *in vitro* flocculation. The antigen for this test was prepared by differential centrifugation of infected yolk sac emulsion. By this means the elementary bodies, which appear to constitute infectious particles of virus, may be partially purified and concentrated. Dilutions of the immune chicken serum were made and antigen added as in an ordinary bacterial agglutination test. Final dilutions of serum were from 1:4 to 1:1,024. For suspending the antigen and making dilutions of serum, saline solution lightly buffered at pH 7.0 was used. After incubation at 50° C for 12 hours, flocculation was visible in the first 5 tubes (1:4 to 1:64), with the maximum at 1:16. No flocculation appeared in a parallel series of tubes with normal chicken serum. Although the flocculated matter, when stained, was seen to contain aggregated elementary bodies, much of the floccule consisted of a more highly dispersed lightly staining material. This was always encountered during attempts at purification of elementary bodies, and its removal proved to be extremely difficult. However, by continued manipulation, a few suspensions of elementary bodies were prepared in which this more highly dispersed material was not detectable. Floccules appeared when these suspensions were mixed with the chicken antiserum on a slide, and staining of such preparations revealed the floccules to be composed only of aggregated elementary bodies. Thus, the antiserum appears to contain an agglutinin for the elementary bodies and an antibody capable of flocculating the more disperse material.

Following the demonstration that this chicken antiserum neutralized virus in the ordinary *in vitro* test, several experiments were performed to test its prophylactic and therapeutic effect on the disease in the mouse. Table 2 gives a representative protocol. A definite protective effect is evident when a single dose of serum is given either before or after the virus inoculation. Other experiments show that even a greater therapeutic effect may be obtained when several serum injections are made during the 3 days following virus inoculation.

TABLE 2

PROTECTION OF MICE AGAINST MOUSE PNEUMONITIS BY ADMINISTRATION OF IMMUNE CHICKEN SERUM AT VARYING PERIODS BEFORE AND AFTER VIRUS INOCULATION

Serum administration, 0.03 cc intranasally	Result with normal serums	Result with immune serums
6 hours before virus inoc.	4.2	1.6
1 hour before virus inoc.	4.8	1.1
1 hour after virus inoc.	4.0	3.1
1 and 3 hours after virus inoc.	4.4	2.6
4 hours after virus inoc.	4.0	2.4

Virus inoculation made intranasally with 0.03 cc emulsion of infected yolk sac. All surviving mice autopsied on 5th day. Figures represent average infectivity scores (see legend, Table 1) of 8 to 11 mice.

The successful use of the chicken for producing antibody against this agent may indicate a satisfactory method of antiserum production against other viruses of this group. Serums of good neutralizing titer or suitable for *in vitro* flocculation tests would be of great advantage in clarifying the antigenic relationships within this group. It is also possible that such serums would prove of value in treatment of human infections with these agents. Further investigation along these lines is under way.

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ATTEMPTS TO PROTECT AGAINST INFLUENZA VIRUS WITH VARIOUS SULFONAMIDES, ACRIDINES AND ANTIBIOTICS[1]

SEVERAL sulfonamides, acridines and antibiotics

[1] The opinions advanced in this publication are those of

have been tested in this laboratory to determine their effectiveness in conferring protection against influenza virus. It has been reported by other workers that certain sulfonamides used in conjunction with azochloramide,[2, 3, 4] pyridium[5] or neoarsphenamine[6] against bacteria gave better results than when either compound alone was used. Accordingly, experiments were conducted to determine if the same combinations would prove effective against influenza virus, although it has already been demonstrated that many sulfonamides,[7, 8] some acridines[8] and penicillin[8] administered alone were ineffective as protective agents.

The PR–8 strain of influenza A virus was used throughout our experiments. Each sulfonamide listed below was tested alone and in combination with azochloramide, pyridium and neoarsphenamine. Two procedures were followed:

(1) Equal volumes of drug solution and mouse lung virus suspension were mixed so that the final concentration of virus was 10 MLD/0.05 cc. The mixture was then held at refrigerator temperature (4° C.) for 2 hours, after which period 0.05 cc was inoculated intranasally into each of six white mice.

(2) Daily intraperitoneal injections of the compound under test were given to white mice for a period of 12 days. On the second day of the series each animal received an intranasal inoculation of 0.05 cc of mouse lung virus suspension containing 10 MLD's. Those animals which died during a 10-day period of observation were immediately autopsied. If more than one half of the total lung tissue was consolidated the mice were considered to have died from influenzal infection. On the 10th day after intranasal inoculation of virus all surviving mice were sacrificed and the extent of pulmonary consolidation recorded.

The following compounds were studied:

SULFONAMIDES

Drug	Dosage Administered Daily (contained in 0.2 cc)
1. Sulfanilamide	1 mg
2. Sulfathiazole	1 mg
3. Sulfapyridine	1 mg
4. Sulfadiazine	1 mg
5. Benzenesulfamido-m-ethylphenol[9]	4 mg
6. 2-amino-5-azobenzenesulfonamido-pyridine[9]	4 mg
7. Carbonyldisulfanilamide[9]	3 mg
8. Thionyldisulfanilamide[9]	4 mg
9. Azobenzenesulfonamidotrypaflavine hydrochloride[9]	1 mg
10. 2-ethoxy-6,9-diaminoazobenzene-sulfonamido-acridine[9]	1 mg
11. Caproyl-p-benzenesulfonamide[9]	4 mg
12. Caproaldehydesulfonamide[9]	4 mg
13. O-hydroxybenzyl-p-aminobenzene-sulfonamide[9]	4 mg
14. Sulfuramine[9]	1 mg
15. 2-ethoxy-6,9-diaminobenzeneamido-thiazol-acridine[9]	4 mg

ACRIDINES

1. Trypaflavine[9]	2 mg
2. Proflavinehydrochloride[9]	2 mg
3. Rivanol[9]	2 mg

ANTIBIOTICS

1. Penicillin[10]	5 mg (650 Oxford Units)
2. Tyrothricin[11]	5 mg
3. Tyrocidin[11]	5 mg
4. Gramicidin[11]	5 mg
5. Subtilin[11]	5 mg

OTHER COMPOUNDS

1. Azochloramid	0.02 mg
2. Pyridium	0.02 mg
3. Neoarsphenamine	0.001 mg

None of the compounds tested under the conditions of these experiments, alone or in combination, was effective in preventing influenzal infection in mice.

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the writers and do not represent the official views of the Navy Department.

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[9] Obtained from Dr. Frederick Proescher, pathologist, Santa Clara Hospital, San Jose, California.

[10] Obtained from Merck and Company, Rahway, N. J.

[11] Obtained from the Western Regional Research Laboratory of the Agricultural Research Administration, Bureau of Agricultural and Industrial Chemistry, U. S. Department of Agriculture.

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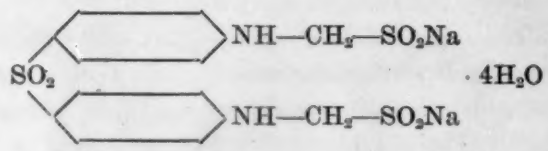
SCIENTIFIC APPARATUS AND LABORATORY METHODS

DIASONE. A NEW AND ACTIVE CHEMOTHERAPEUTIC AGENT

DISODIUM formaldehyde sulfoxylate diaminodiphenylsulfone, designated as Diasone, has the following chemical structure:



It was synthesized by us in 1937.[1,2] Diasone is water soluble, forming fairly concentrated solutions, stabilized by the addition of small quantities of sodium bicarbonate. For years the writer was interested in the detoxifying effect of sodium formaldehyde sulfoxylate upon arsphenamine,[3] the toxicity of which was greatly diminished without proportionate reduction of the therapeutic effect. In other words, the ratio of $\frac{\text{maximum tolerated dose}}{\text{minimum therapeutic dose}}$ was shifted in favor of neoarsphenamine, which is a sodium formaldehyde sulfoxylate derivative of arsphenamine. This has been conspicuously demonstrated in rat trypanosomiasis, rabbit syphilis and human syphilis.

We found that the same improvement in the ratio $\frac{\text{maximum tolerated dose}}{\text{minimum therapeutic dose}}$ occurred when we combined 4,4′-diaminodiphenylsulfone with sodium formaldehyde sulfoxylate. The reduction in toxicity was found to be most impressive. The diaminodiphenylsulfone is known to be toxic to mice, which tolerate at most a single oral dose of 0.200 gms per kilogram of body weight.[4] The maximum tolerated dose of Diasone given to mice by mouth is much larger, namely 4 grams. Rats tolerate a single dose of 7 grams per kilo and rabbits 3½ grams per kilo. Dogs 30 to 40 pounds in weight which were given 60 consecutive daily doses of 1 gram each tolerated the drug without loss in weight or any visible disturbance.

As to the therapeutic efficiency, we found that mice, infected with the streptococcus hemolytic strain C 203 and treated with Diasone by the drug food method, were cured—the drug proving to be as effective as sulfanilamide. In similar experiments, performed on mice infected with pneumococcus type II, Diasone appeared to be almost as effective as sulfadiazine.

The most important therapeutic property of this chemical compound, however, manifests itself in experimental tuberculosis. Since 1938,[5] various investigators became interested in sulfanilamide in the treatment of tuberculosis in guinea pigs. Feldman and Hinshaw[6] extended this observation to sulfapyridine and finally to a derivative of diaminodiphenylsulfone, known as Promin.[7] Callomon[8] found Diasone to be decidedly less toxic than Promin. When mortality and histological changes due to tuberculosis in guinea pigs were considered, Diasone produced the most beneficial therapeutic results among various compounds administered, including Promin. Feldman, Hinshaw and Moses[9] also found Diasone to be an effective therapeutic agent in experimental tuberculosis.

With its background of low toxicity and effectiveness in experimental infection, this drug gives promise of favorable clinical application in tuberculosis.

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[1] The chemistry of Diasone is described in a paper by G. W. Raiziss, R. Clemence and M. Freifelder, entitled "Synthesis and Chemical Properties of Diasone." To be published.

[2] A similar product was simultaneously and independently prepared, using a different method, by H. Bauer and S. M. Rosenthal, "Studies in Chemotherapy" VII. Some new sulphur compounds active against bacterial infections, *Pub. Health Rep.*, 53: 40, 1938.

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